1343.46160X00

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: Ishida et al.

Serial No.: 10/578,714

Filed: May 10, 2006

For: SPEAKER DIAPHRAGM

Art Unit: 1796

Examiner: Pak

Conf. No.: 3399

REQUEST FOR RECONSIDERATION AFTER FINAL REJECTION UNDER 37 CFR 1.116

Commissioner For Patents
P.O. Box 1450
Alexandria, VA 22313-1450

December 22, 2009

Sir:

This is in response to the Office Action mailed October 16, 2009, in connection with the above-identified application.

Claims 1-3, 5, 6, 8, 14 and 21-33 stand rejected under 35 U.S.C. 103(a) as being obvious over either U.S. Patent No. 5,274,119 to Uryu et al. or U.S. Patent No. 4,518,642 to Johnston et al. in view of WO 2004/054315 A1 to Ishida et al., the Examiner relying on U.S. Patent Application Publication No. 2006/0225950 A1 as an English equivalent of Ishida et al. Applicants again traverse this rejection and request reconsideration thereof.

The present invention relates to a speaker diaphragm. According to the present invention, the diaphragm is molded from a mixture including a non-chlorinated synthetic resin and a powdery cellulose material whose

particle size falls within a range of from 5 μm to 500 μm. In order to enhance the affinity of the powdery cellulose material to the non-chlorinated synthetic resin, the powdery cellulose material in the mixture has been subjected to an esterification surface treatment using an anhydride of a polybasic acid. The speaker diaphragm is made by molding such a mixture. As set forth in claim 8, the mixture can also include an inorganic peroxide. Such a speaker diaphragm is not disclosed or rendered obvious by any of the cited documents or even a combination thereof.

The Uryu et al. patent discloses that an acoustic diaphragm is obtained by forming micro-fibrillated cellulose into a web by a process similar to a paper-making process. The micro-fibrillated cellulose is the cellulose obtained by beating to the Canadian standard freeness of not more than 300 ml, or bacterial cellulose. Since the micro-fibrillated cellulose is poor in wet strength, it is reinforced by a reinforcement element and, in this state, is formed into the web on a wire screen. The reinforcement element may be detached after forming the web, or may be left laminated with the cellulose web so that the resulting composite product is used as the acoustic diaphragm.

This patent also discloses that, for forming the web, high-polymer fibers such as carbon fibers, glass fibers, aramide fibers, polyolefin fibers, ultra-drawn polyolefin resins or polyester resins may be mixed as reinforcements into the micro-fibrillated cellulose.

As recognized by the Examiner, this patent does not disclose the speaker diaphragm of the present invention since it does not disclose a speaker diaphragm made from the mixture set forth in claim 1 or 8. For

example, the Uryu et al. patent does not disclose a speaker diaphragm molded from a mixture comprising a non-chlorinated synthetic resin and powdery cellulose material whose particle size falls within a range of 5 μm to 500 μm. Such a particle size is not disclosed for the micro-fibrillate cellulose in Uryu et al. Nor is there any disclosure in Uryu et al. that the cellulose material should be subjected to an esterification surface treatment using an anhydride of a polybasic acid to enhanced its infinity to a non-chlorinated synthetic resin.

The Johnston et al. patent discloses a loudspeaker diaphragm is formed of a slurry of cellulose fibers and polypropylene fibers. In the fabrication of the diaphragm, a felt is made of the slurry, and the felt is subjected to sufficient heat and pressure to fuse the polypropylene fibers together to form a skeleton or matrix which extends through the felt.

It is disclosed that the ratio thermoplastic fibers to paper-making fibers can be varied broadly, at least within the range of 10% to 50% thermoplastic fiber (dry weight) to paper-making fiber (dry weight), the preferred ratio of the dry weight of the polypropylene fibers to the dry weight of the paper-making fibers being in the range of 0.2 to 0.3.

As recognized by the Examiner, the Johnston et al. patent also does not disclose the speaker diaphragm of the present invention, molded from the mixture set forth in claim 1 or claim 8.

Like the Uryu et al. patent, the Johnston et al. patent does not disclose a speaker diaphragm molded from a mixture comprising a non-chlorinated synthetic resin and powdery cellulose material whose particle size falls within

a range of from 5 μm to 500 μm. Such a particle size is not disclosed in Johnston et al. Nor does the Johnston et al. patent disclose that the cellulose material should be subjected to an esterification surface treatment using an anhydride of a polybasic acid to enhance its affinity to a non-chlorinated synthetic resin.

Thus, the Johnston et al. patent, like the Uryu et al. patent does not disclose and would not have rendered obvious the presently claimed speaker diaphragm.

The Ishida et al. publication discloses a smaller-sized speaker cabinet made of a mixture that is composed of a woody cellulose powder of proper physical properties and a synthetic resin blended with this powder. The resin is a non-chlorinated resin, and the cellulose powder consists of particles whose diameters are included in a range from about 5 μm to 500 μm. The cellulose powder is surface-treated to increase affinity for the resin, so that efficient manufacture of the cabinets of improved acoustic performance is now possible.

Without admitting that the Ishida et al. publication is prior art, it is noted that while the mixture described therein comprises a chlorine-free synthetic resin and cellulosic powder having a particle size distribution of 5 μm to 500 μm, the cellulosic powder having been surface-treated in order to impart an affinity to the synthetic resin, the mixture is used to form a speaker cabinet. Nothing is mentioned in Ishida et al. about using the mixture for molding a speaker diaphragm. Moreover, nothing in Uryu et al. or Johnston et al. would have provided any reason for using the mixture described in Ishida et al.,

which is used for a speaker cabinet, as a mixture for molding a speaker diaphragm.

The Office Action alleges that "Ishida et al. further disclose the resulting mixed material improves acoustic performance" and "[t]hus, it would have been obvious to one of ordinary skill in the art to use the material taught by Ishida et al. as the material used to make the diaphragm or Uryu et al. or Johnston et al. to obtain desired acoustic properties."

However, the acoustic performance in Ishida et al. relates to a speaker cabinet and not to speaker diaphragm as the present application, and therefore, it is doubtful one of ordinary skill in the art would have any reason to look to Ishida et al. to improve the performance of the speaker diaphragm of Uryu et al. or Johnston et al.

The material for a speaker cabinet in Ishida et al. does not directly relate to a material for a speaker diaphragm, and therefore, there would not have been any reason for one of ordinary skill in the art to conduct any further research to find out whether the material in Ishida et al. is suitable for a speaker diaphragm. One of ordinary skill in the art would not have used the material for a cabinet, which is generally thick, for a thin speaker diaphragm, which requires subtle vibration properties, in order to improve the performance.

Applicants submit a speaker diaphragm is technologically completely different than a speaker cabinet.

Accordingly, there would have been no reason to combine the teachings of Ishida et al. with those of Uryu et al. or Johnston et al.

With respect to claims 28 and 33, it has been urged in the Office Action that "Ishida et al. discloses employing an effective amount of mixing material to obtain a desired thickness of the speaker diaphragm" and that "[s]ince the amount of the mixing material affects the thickness of the speaker diaphragm, the mixing materials is the results-effective variable." However, neither paragraph 0010 nor 0019 of Ishida et al. to which the Examiner refers equates the amount of mixing material to the thickness of the speaker, cabinet, much less to the thickness of a speaker diaphragm. While the wall thickness of the speaker cabinet is disclosed in paragraph 0019 of Ishida et al., there is no disclosure that this is a "result-effective variable." Moreover, the discussion of the wall thickness of a speaker cabinet has absolutely nothing to do with the thickness of a speaker diaphragm. Accordingly, claims 28 and 33 are patentable for these additional reasons.

In view of the foregoing remarks, favorable reconsideration and allowance of all the claims now in the application are requested.

Please charge any shortage in the fees due in connection with the filing of this paper, to the deposit account of Antonelli, Terry, Stout & Kraus, LLP, Deposit Account No. 01-2135 (Case: 1343.46160X00), and please credit any excess fees to such deposit account.

Respectfully submitted,

ANTONELLI, TERRY, STOUT & KRAUS, LLP

/Alan E. Schiavelli/
Alan E. Schiavelli
Registration No. 32,087

AES/at
(703) 312-6600